

AVERY WATER AND SEWER DISTRICT (PWSNO 1400004) SOURCE WATER ASSESSMENT REPORT

February 27, 2003



State of Idaho Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This risk assessment is based on a land use inventory in the well recharge zone, sensitivity factors associated with how the well was constructed, and aquifer characteristics.

This report, *Source Water Assessment for the Avery Water and Sewer District*, describes the public drinking water well; the well recharge zone and potential contaminant sites located inside the recharge zone boundaries.

This assessment, taken into account with local knowledge and concerns, should be used as a planning tool to develop and implement appropriate protection measures for this public water system. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

A single well pumping from an alluvial aquifer paralleling the St Joe River supplies drinking water for the Avery Water and Sewer District. The water system serves a residential population of 100 people in the unincorporated town of Avery in Shoshone County Idaho. The well was drilled at an unknown date and has been in use since 1986-87 when it was brought on line to replace the Avery Creek surface water source. The water is chlorinated before entering the distribution system. A ground water susceptibility analysis conducted by DEQ January 7, 2003 ranked the well highly susceptible to microbial and inorganic chemical contamination because of the presence of a septic tank 85 to 90 feet south of the well.

The risk of synthetic and volatile organic chemical contamination is moderate. Risk factors related to the well's construction, its relative shallowness (30 to 60 feet), and geological features intrinsic to its location added the most points to the final susceptibility scores.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies, please contact your regional Department of Environmental Quality office or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR AVERY WATER AND SEWER DISTRICT

Section 1. Introduction - Basis for Assessment

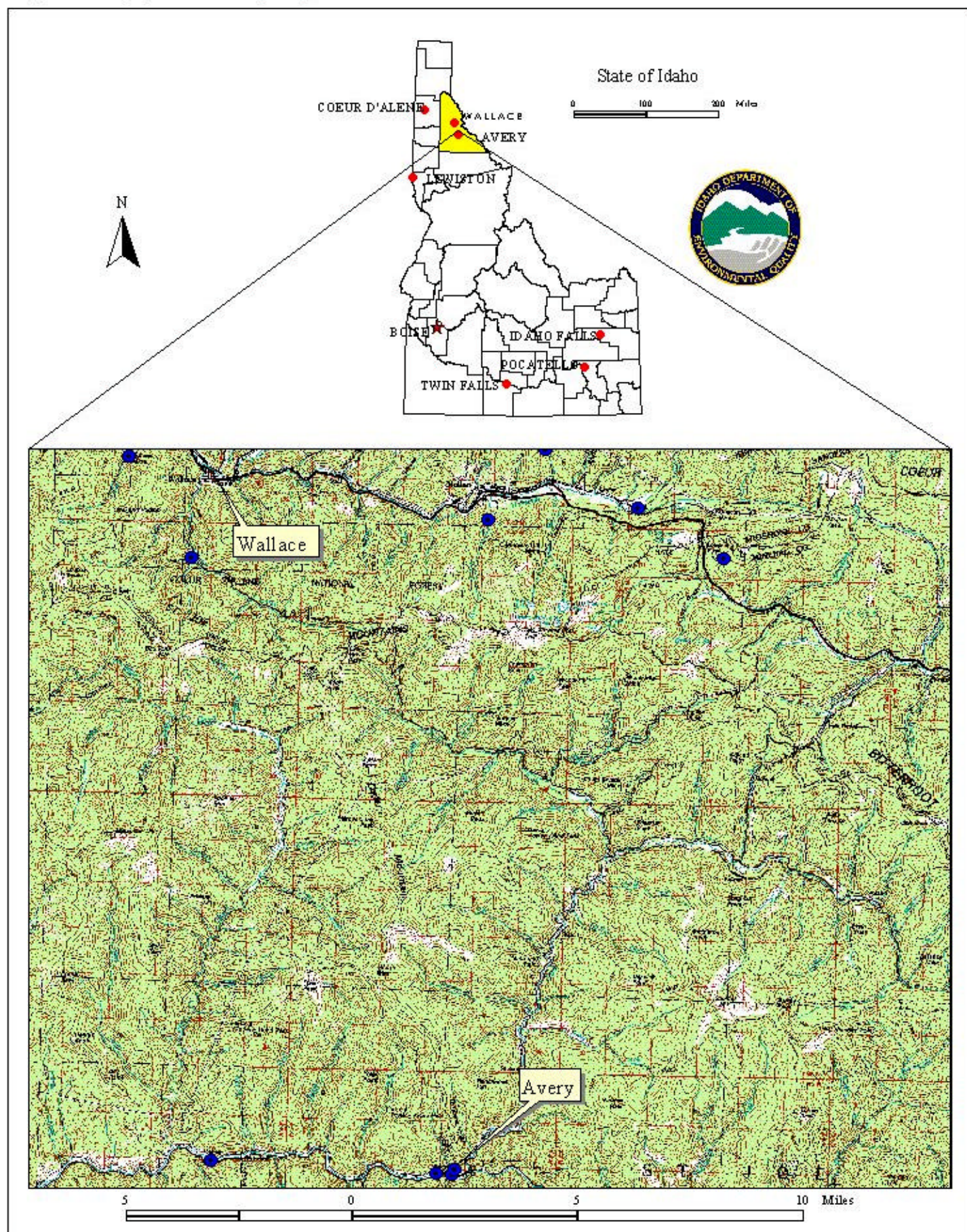
The following sections contain information necessary for understanding how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and an inventory of significant potential sources of contamination identified within that area are included. The ground water Susceptibility Analysis Worksheet used to develop this assessment is attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess every public drinking water source in Idaho for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. These assessments are based on a land use inventory inside the delineated recharge zones, sensitivity factors associated with how the well is constructed, and aquifer characteristics. The state must complete more than 2900 assessments by May of 2003. Because resources and the time available to accomplish assessments are limited, an in-depth, site-specific investigation for every public water system is not possible.

The results of the source water assessment should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system. The ultimate goal of this assessment is to provide data to local communities for developing a protection strategy for their drinking water supply. The Idaho Department of Environmental Quality recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Figure 1. Geographic Location of Avery Water and Sewer District



Section 2. Preparing for the Assessment

Defining the Zones of Contribution - Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the well recharge area into time of travel zones indicating the number of years necessary for a particle of water flowing through the aquifer to reach a well. The ground water flow model used data assimilated by DEQ from a variety of sources including local well logs and pumping volume estimates for the Avery Water and Sewer District well.

Avery Water and Sewer District operates community water system with 35 connections serving a population of 100 people in the unincorporated town of Avery on the St. Joe River. (Figure 1). The well was drilled at an unknown date and is estimated to be 30 to 60 feet deep. The capacity of the well is 90 gallons per minute.

The source water assessment delineation for the Avery Water and Sewer District well encompasses about 950 acres divided into 0-3, 3-6 and 6-10 year time of travel zones. Three specific capacity tests for wells in the Avery/Calder vicinity show a drawdown of 0 to 4 feet for multi-hour tests. This result indicates that the cone of depression reached a source of constant recharge. With the wells drilled into the alluvium and close to the St. Joe River, the implication is that the wells are producing river water that has been filtered through the alluvium. The Avery Water and Sewer District well is located to the north of the St. Joe River, so the delineation was focused on the tributaries to the north. Ground water flow simulations were run with a hydraulic conductivity of 200 feet per day. The thickness of aquifer was estimated to be 10 feet, with a porosity value of 0.2, and a recharge value of 1 foot per year. The steep gradient of the northern tributaries accounts for the greater length and narrower width (600 feet) of the delineation compared with delineations for wells on the south side of the river (Figure 2).

Identifying Potential Sources of Contamination

The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. Inventories for all public water systems in Idaho were conducted in two-phases. The first phase involved identifying and documenting potential contaminant sources within a system's source water assessment area through the use of computer databases and Geographic Information System maps developed by DEQ. Maps showing the delineations and tables summarizing the results of the database search were then sent to system operators for review and correction during the second or enhanced phase of the inventory process. Niell Ott reviewed the inventory for Avery Water and Sewer District. Information from the public water system file was also incorporated into the potential contaminant inventory.

Figure 2, *Avery Water and Sewer District Delineation and Potential Contaminant Inventory* on page 7 of this report shows the location of the Avery Water and Sewer District well, the zone of contribution DEQ delineated for it, and potential contaminant sites in the vicinity. Part of the town of Avery lies inside the 0-3 year time of travel zone. Outside of the town, most of the land is undeveloped forest.

Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. When a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation.

Section 3. Susceptibility Analysis

The susceptibility to contamination of all ground water sources in Idaho is being assessed on the following factors:

- physical integrity of the well,
- hydrologic characteristics,
- land use characteristics, and potentially significant contaminant sources
- historic water quality

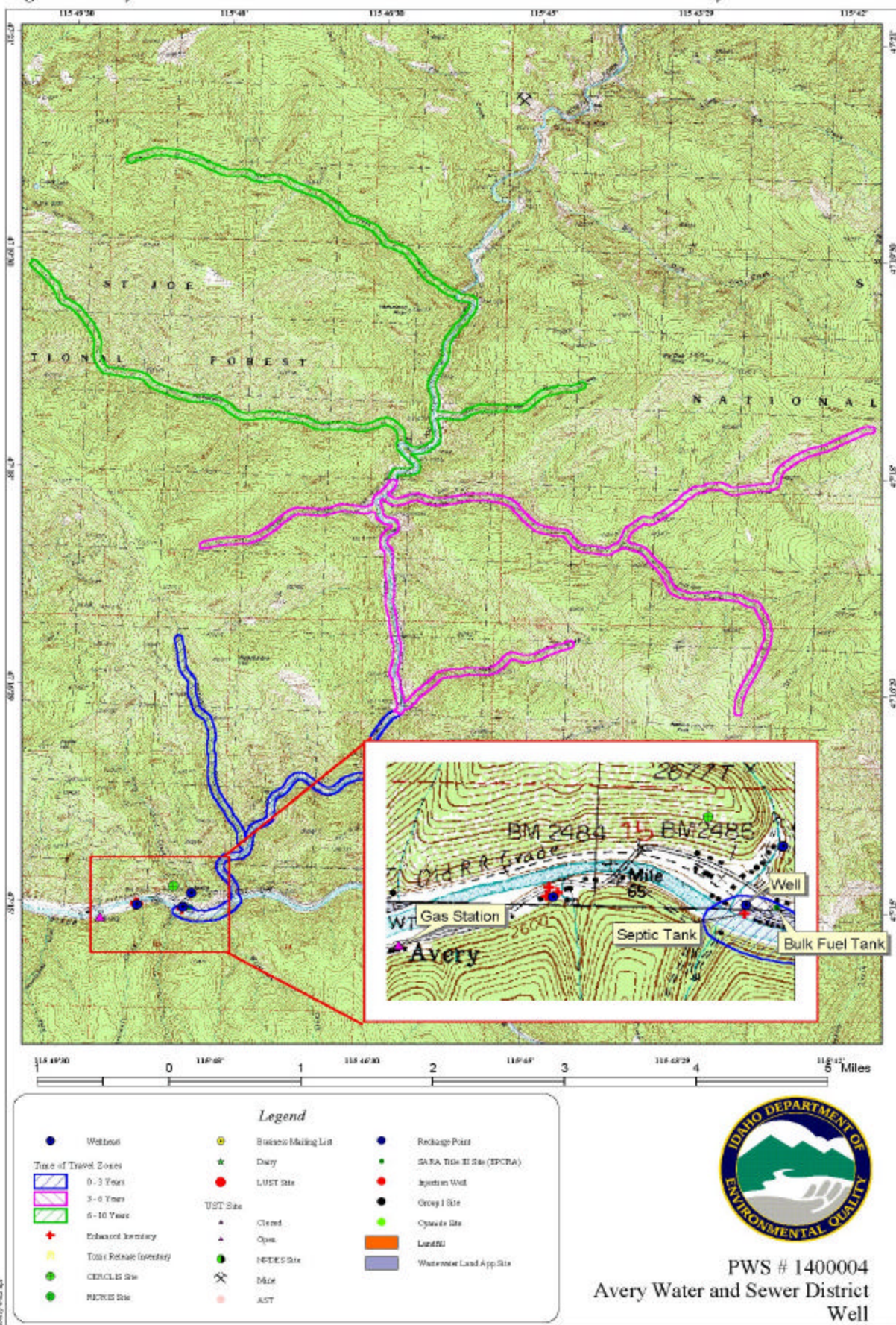
The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. A high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking. The Susceptibility Analysis Worksheet for the Avery Water and Sewer District well, Attachment A, shows in detail how the well was scored.

Well Construction

Well construction directly affects the ability of the wells to protect the aquifer from contaminants. Lower scores imply a well that can better protect the water. This portion of the susceptibility analysis relies on information from individual well logs and from the most recent sanitary survey of the public water system. The Avery Water and Sewer District well log is not on file with DEQ, so several factors used to assess vulnerability to contamination are unknown. No deficiencies in the wellhead and surface seal maintenance were noted during a sanitary survey in June 2002.

The Avery Water and Sewer District well was drilled in at an unknown date and has been in use since the late 1980s when it was connected to the Avery Water and Sewer District system to replace the surface water source in Avery Creek. Estimates of the well's depth vary from 30 to 60 feet. The well is located in a pump house with a concrete floor sloped to a sump in the southeast corner. Both the pump house floor and wellhead are below grade, a practice no longer allowed under current Idaho Department of Water Resources well construction standards. The sanitary survey notes however that the well site is properly drained and protected from flooding.

Figure 2. Avery Water and Sewer District Delineation and Potential Contaminant Inventory.



Hydrologic Sensitivity

Hydrologic sensitivity scores reflect natural geologic conditions at the well site and in the recharge zone. Information for this part of the analysis is derived from individual well logs and from the soil drainage classification inside the delineation boundaries. The Avery Water and Sewer District well scored 6 points out of 6 points possible in the hydrologic sensitivity portion of the susceptibility analysis.

Soils in the recharge zone generally are composed of moderately well to well drained materials. Soils that drain rapidly are deemed less protective of ground water than slow draining soils. Because the well log is unavailable, the soil composition above the water table at the well site is not known. The well is about 260 feet north of the St. Joe River, and apparently above the 100-year flood plain.

Potential Contaminant Sources and Land Use

Figure 2, *Avery Water and Sewer District Delineation and Potential Contaminant Inventory* on page 7 shows the location of the Avery Water and Sewer District well, and the zone of contribution DEQ delineated for it. The well is about 260 feet north of the river, a potential source of microbial contaminants. The town of Avery is partially inside the 0-3 year time of travel zone. Homes in the town are connected to a community sewer system. A chemical monitoring waiver application in the public drinking water file for Avery Water and Sewer district notes the presence of an individual septic tank 85 to 90 feet south of the well. IDAPA 16.01.08 specifies a minimum 100-foot separation distance between wells and septic tanks or drainfields. In addition to microbial contaminants, septic system components are potential sources of nitrates. The only other potential contaminant site documented inside the delineation boundaries is a bulk fuel storage facility about 380 feet east of the well.

Historic Water Quality

Avery Water and Sewer District has always chlorinated its water to control microbial contamination thought to enter the water through the antiquated reservoir and distribution system. The system has begun testing to determine whether microbial contaminants are in the ground water itself. Two samples submitted for microscopic particulate analysis (MPA) have received scores of 4. Generally, if a water system receives scores of 0-9 repeatedly, it can be considered at low risk for direct surface water influence, but water quality data and on site surveys should be used in conjunction with MPA results in making the final determination. Results of tests for total coliform bacteria in untreated water samples are mixed. The first sample, collected on October 28, 2002, was positive. The raw water sample collected December 22, 2002 was negative for total coliform. Chemical sampling results for Avery Water and Sewer District are summarized on the table below.

Table 1. Avery Water and Sewer District Chemical Sampling Results

Primary IOC Contaminants (Mandatory Tests)							
Contaminant	MCL (mg/l)	Results (mg/l)	Dates	Contaminant	MCL (mg/l)	Results (mg/l)	Dates
Antimony	0.006	ND	3/20/95, 12/31/01	Nitrate	10	ND to 0.854	11/26/80 through 11/19/02
Arsenic	0.01	ND	11/26/80 through 12/31/01	Nickel	N/A	ND	5/14/94 through 12/31/01
Barium	2	ND 0.0127	11/26/80 through 12/31/01; 5/14/94	Selenium	0.05	ND	11/26/80 through 12/31/01
Beryllium	0.004	ND	5/14/94 through 12/31/01	Sodium	N/A	3.4 to 4.0	5/16/85 through 12/31/01
Cadmium	0.005	ND	11/26/80 through 12/31/01	Thallium	0.002	ND	3/20/95, 12/31/01
Chromium	0.1	ND	11/26/80 through 12/31/01	Cyanide	0.02	ND	3/20/95
Mercury	0.002	ND	11/26/80 through 12/31/01	Fluoride	4.0	ND	11/26/80 through 12/31/01
Secondary and Other IOC Contaminants (Optional Tests)							
Contaminant	Recommended Maximum (mg/l)		Results (mg/l)			Dates	
Iron			0.02, 0.13			12/6/90, 5/16/85	
Sulfate			4.75			3/20/95	
Regulated and Unregulated Synthetic Organic Chemicals							
Contaminant			Results		Dates		
29 Regulated and 13 Unregulated Synthetic Organic Compounds			None Detected		9/28/93, 12/7/98,7/26/01		
Regulated and Unregulated Volatile Organic Chemicals							
Contaminant			Results		Dates		
21 Regulated And 16 Unregulated Volatile Organic Compounds			None Detected		9/28/93 , 7/26/01		
Radiological Contaminants							
Contaminant		MCL	Results		Dates		
Gross Alpha, Including Ra & U		15 pC/l	0.1 to 3.0 pC/l		9/9/80 to 11/8/00		
Gross Beta Particle Activity		4 mrem/year	1.1 to 3.0 mrem		9/9/80 to 11/8/00		

Final Susceptibility Ranking

The Avery Water and Sewer District well ranked highly susceptible to microbial and inorganic chemical contamination because of the septic tank inside of the 100-foot setback required under the *Idaho Rules for Public Water Systems*. The risk of synthetic or volatile organic chemical contamination is moderate. 10 of the 11 points counted against the well in the final susceptibility scores derive from risk factors related to the relative shallowness of the well and its location in an unconfined alluvial aquifer. Most of the well recharge zone is undeveloped forest with few potential contaminant sites inside its boundaries. Total scores for system construction and hydrologic sensitivity along with the cumulative scores for land use and potential contaminant sites are shown on Table 2.

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score =
Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)
- 2) Microbial Final Score =
Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

The final ranking categories are as follows:

- 0 - 5 Low Susceptibility
- 6 - 12 Moderate Susceptibility
- > 13 High Susceptibility. The complete Susceptibility Analysis Worksheet for the Avery Water and Sewer District well can be found in Attachment A.

Table 2. Summary of Avery Water and Sewer District Susceptibility Evaluation

Cumulative Susceptibility Scores						
Well Name	System Construction	Hydrologic Sensitivity	Contaminant Inventory			
			IOC	VOC	SOC	Microbial
Well #1	4	6	2	5	5	6
Final Susceptibility Score/Ranking						
	IOC	VOC	SOC	Microbial		
Well #1	*High	11//Moderate	11//Moderate	*High		

IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

*High due to presence of septic tank inside sanitary setback.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

Avery Water and Sewer District already has some important drinking water protection measures in place. The well is located in locked well house with a concrete floor that prevents foreign matter and surface water from entering the well. While the district does not own or lease the entire 50-foot radius around the well, sanitary surveys note that the area is kept free of potential contaminants and properly drained. The system is well run and was mostly in compliance with the Idaho Rules for Public Drinking Water Systems when it was inspected in June 2002. The district has adopted a cross connection control ordinance, installed a tap for collecting raw water samples, and has started testing the untreated water as required.

The exact location of the nearby septic tank relative to the well should be documented. It may be necessary to move the tank or to apply for a waiver from the required setback distance. A voluntary measure every system should implement is development of a water emergency response plan. There is a simple fill-in-the-blanks form available on the DEQ website to guide systems through the process.

Assistance

Public water suppliers and users may call the following IDEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the IDEQ office for preliminary review and comments.

Coeur d'Alene Regional DEQ Office (208) 769-1422

State IDEQ Office (208) 373-0502

Website: www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper of the Idaho Rural Association (208) 343-7001 for assistance with drinking water protection strategies. Website: www.idahoruralwater.com

References Cited

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Attachment A

Avery Water and Sewer District Susceptibility Analysis Worksheet

Ground Water Susceptibility

Public Water System Name : **AVERY WATER AND SEWER DIST**

Source: **WELL #1**

Public Water System Number : **1400004**

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1. System Construction		SCORE			
Drill Date	UNKNOWN				
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES 2002				
Well meets IDWR construction standards	UNKNOWN	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	UNKNOWN	2			
Highest production 100 feet below static water level	NO	1			
Well PROTECTED FROM FLOODING	YES	0			
Total System Construction Score		4			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	UNKNOWN	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	UNKNOWN	2			
Total Hydrologic Score		6			
3. Potential Contaminant / Land Use -Near Well		IOC	VOC	SOC	Microbial
		Score	Score	Score	Score
Land Use	Residential	2	2	2	2
Farm chemical use high	NO	0	0	0	
IOC, VOC, SOC, or Microbial sources in Sanitary Setback	YES	YES	NO	NO	YES
Total Potential Contaminant Source/Land Use Score Near Well		2	2	2	2
Potential Contaminant / Land Use - ZONE 1B (3 YR. TOT)					
Contaminant sources present (Number of Sources)	YES. Surface Water, Bulk Fuel Storage		1	1	2
(Score = # Sources X 2) 8 Points Maximum			2	2	4
Sources of Class II or III leacheable contaminants or Microbials	YES		1	1	
4 Points Maximum			1	1	
Zone 1B contains or intercepts a Group 1 Area	NO	0	0	0	0
Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		0	3	3	4
Potential Contaminant / Land Use - ZONE II (6 YR. TOT)					
Contaminant Sources Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Land Use Zone II	Less than 25% Agricultural Land	0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		0	0	0	0
Potential Contaminant / Land Use - ZONE III (10 YR. TOT)					
Contaminant Source Present	NO	0	0	0	
Sources of Class II or III leacheable contaminants or Microbials	NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of Zone	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		0	0	0	0
Cumulative Potential Contaminant / Land Use Score		2	5	5	6
4. Final Susceptibility Source Score		10	11	11	12
5. Final Well Ranking		*High	Moderate	Moderate	*High

POTENTIAL CONTAMINANT INVENTORY

List of Acronyms and Definitions

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ? Superfund? is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.